Using Computational Modeling to Study the Impact of Workplace Characteristics on Patient Safety Outcomes

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Introduction

How do patient characteristics, organization characteristics and patient care unit characteristics interact to affect quality, safety, and cost outcomes? What changes can nurse managers make on their units that will optimize outcomes for their patients? To answer these questions, we are collecting data from 35 nursing units in 12 hospitals in Arizona, and using the results as a basis for computational modeling. Although it has been used in clinical research, until now computational modeling has had little application to healthcare or nursing organizations. In this poster session, we describe our application of *Orgahead*, a computational modeling program.

Using Orgahead

Orgahead is a theoretically based computational modeling program for examining organizational performance. Because the focus of our research is on identifying interventions that nurse managers can implement on their units, our "organization" is actually the patient care unit.

Using *Orgahead* requires five steps:

1. Identify the core variables in *Orgahead* that correspond to the constructs in the conceptual model (Fig. 1) (e.g., unit size, dynamism, or culture).

2. Explore the parameter space. This requires defining the range of values that specific variables can take. Selecting the parameters that will be allowed to vary and values for those parameters defines a virtual experiment.

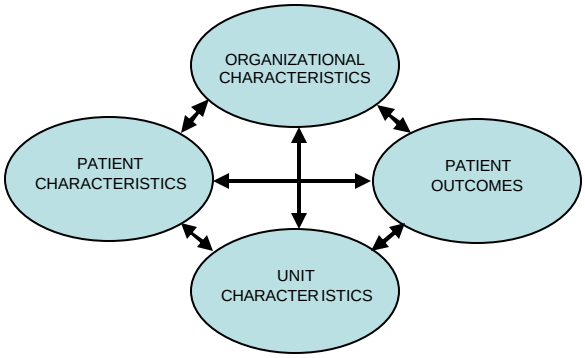

Figure 1. ***The SRO Model, the conceptual framework for the research***

3. Set non-core variables for each patient care unit, based on actual data.

4. Run virtual experiments. Each organization is simulated for a number of iterations corresponding to its 6-month total patient days. Performance is calculated as the mean of the last 50 patients (tasks).

5. Statistically analyze results.

Demonstration

To show how computational modeling works, we will describe a simple experiment that investigated the effect of task complexity, on the organizational outcomes (e.g., accuracy, LOS) of one virtual unit created by using parameters from data we collected for an existing patient care unit.

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